



SUSTAINABLE BUILDING

What, Why, How

Global Green USA
Presentation to
US Army Corp of Engineers



US Army Corps
of Engineers ®

Global Green USA



- US affiliate of Green Cross International
- Green Cross International is led by President Mikhail Gorbachev
- Global Green USA is headquartered in Los Angeles, California
- Programs focus on Green Building, Energy and Chemical Weapons



Global Green USA

RESCUE PROGRAM



Resource Efficiency and Sustainable Communities for the Urban Environment

Focus Areas

- Local Government Green Building Initiative
- Greening Affordable Housing Initiative
- Sustainable Energy Initiative



Global Green USA

- **Working with public agencies across California on green building programs and policies.**
 - *San Mateo County*
 - *Los Angeles*
 - *Santa Monica*
 - *LA Community College District*
 - *San Francisco*
 - *Santa Clarita*
 - *West Hollywood*
 - *Irvine*
- **Policy initiatives total over \$2 billion in construction.**
- **Active nationally on green building policy, training, and technical assistance.**
- **Member of US Green Building Council Executive Committee and Local Government Committee.**

Principles of Green Building

Site: Minimize disruption and maximize use of ecological or “soft” infrastructure strategies.

Energy: Reduce energy consumption and utilize renewable sources.

Materials: Maximize use of sustainable materials.

Air Quality: Minimize negative impacts on indoor air quality.

Livability/Productivity: Improve the health productivity and motivation of students and faculty.

Green Building Reality



Green Building Myth

Environmental Impacts of Buildings

The construction and operation of buildings have numerous detrimental effects on the local, regional, and global environment:

- 40% of annual US energy use
- 30% of US CO2 production
- 25% of water use
- 20% - 40% of solid waste
- 30% of wood and raw materials
- 30%+ of buildings have poor indoor air (people spend 90% of their time indoors)
- Air pollution
- Global warming
- Water scarcity
- Landfills
- Deforestation
- Public Health
- Habitat loss
- Ozone layer depletion
- Urban Heat Island

Benefits to Owners

- **Lower Operation Costs**
 - Lower energy and water bills
(10% -15% reduction)
 - Reduced maintenance costs
- **Healthier and more productive working environments**
(5-16% increased productivity)
(20% improved performance on testing)
- **Demonstrate environmental leadership**
(Help gain community/political support)

Green Building Is a Process!

Green building is a process that creates buildings and supporting infrastructure that 1) minimize the use of resources, 2) reduce harmful effects on the environment, and 3) develops healthier environments for people.

- Multi-disciplinary design teams
- Collaboration from the beginning
- Holistic vs. linear process
- Systems thinking
- Commitment to performance targets
- Ongoing communication and feedback



5 Green Building Components

- **SITE:** *site selection & planning, landscaping, stormwater management, construction and demo recycling*
- **WATER EFFICIENCY:** *efficient fixtures, wastewater reuse, efficient irrigation*
- **ENERGY/ATMOSPHERE:** *energy efficiency, clean/renewable energy, no HCFCs or CFCs*
- **MATERIALS/RESOURCES:** *materials reuse, efficient building systems, use of recycled and rapidly renewable materials*
- **INDOOR ENVIRONMENTAL QUALITY:** *improved indoor air quality, increased daylighting, better thermal comfort/control*

Spheres of Green Building Benefit

Energy Savings

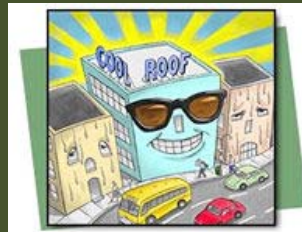


Improved Air Quality



**Direct Benefit
(Individual/Org)**

Reduced Maintenance



Spheres of Green Building Benefit

**Stormwater
Retention**



**Direct & Indirect Benefit
(Regional and Indiv/Org)**

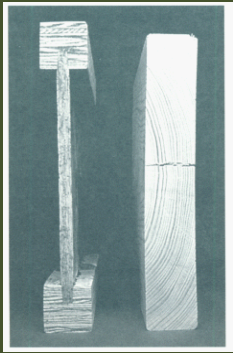
**Direct Benefit
(Individual/Org)**

**Waste
Management/
Recycled
Materials**



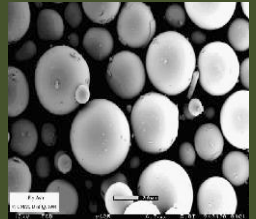
Spheres of Green Building Benefit

Forest
Protection



Indirect
(Global)

Stemming
Climate
Change



Direct & Indirect Benefit
(Regional and Indiv/Org)



Direct Benefit
(Individual/Org)



Guides and Rating Systems

Commercial and Institutional Projects

- City of Austin Green Building Guidelines
- City of Santa Monica Guidelines for Green Building Design and Construction
- New York City High Performance Building Guidelines
- Hennepin County Green Building Guidelines
- Battery Park City Guidelines for High-Rise Residential
- LEED Leadership in Energy and Environmental Design
- BREEAM (European system)



- **Developed by USGBC through a consensus-based process involving diverse industry stakeholders.**
- **A voluntary, consensus-based, market-driven building rating system based on existing proven technologies.**
- **Evaluates environmental performance from a "whole building" perspective over a building's life cycle.**
- **Provides a definitive national standard for what constitutes a "green building."**
- **Performance based system - encourages creative problem solving and collaboration.**
- **Combination of specifics and flexibility make it an effective policy tool.**

LEED™ V 2.1

LEED Categories

- Sustainable Sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovation Credits

Certification Levels

LEED Certified	26-32 pts.
Silver	33-38 pts.
Gold	39-51 pts.
Platinum	52+ pts.
Innovation Credits	4 pts.
Accredited Professional	1 pt.
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TOTAL POINTS	69 pts.

LEED

SITE AND INFRASTRUCTURE STRATEGIES

Erosion and Sedimentation Control

- *Intent* - Control erosion to reduce negative impacts on air and water
- *Requirement* - Design and sediment and erosion plan that conforms to EPA Storm Water Management for Construction Activities, or local erosion and sedimentation codes, whichever is more stringent. The plan must:
 - Prevent loss of soil from stormwater or wind
 - Prevent sedimentation of storm sewer or streams



Site Selection

- *Intent* - Avoid development of inappropriate sites and reduce impact of development on a site.
- *Requirement* - Do not develop buildings on portions of sites that are:
 - Prime agricultural land
 - Land lower than 5 feet above the 100 year flood zone
 - Land that provides habitat for endangered species
 - Land within 100 feet of a wetland
 - Land that was parkland



Urban Redevelopment

- *Intent* - Channel development to urban areas with existing infrastructure, protecting greenfields.
- *Requirement* - Increase local density by utilizing sites located within a minimum density of 60,000 square feet per acre (2-story downtown development)



Brownfield Development

- *Intent* - Rehabilitate damaged sites where development is complicated by environmental contamination.
- *Requirement* - Develop on a site classified as a brownfield and provide remediation as required by EPA



Alternative Transportation

- *Intent* - Reduce pollution and land development impacts from automobile use.
- *Requirement*
 - Locate building within 1/2 mile of a commuter rail, light rail or subway, or 1/4 mile from two bus lines
 - Provide suitable means of securing bicycles
 - Install alternate fuel vehicle charging stations
 - Size parking capacity not to exceed local requirements



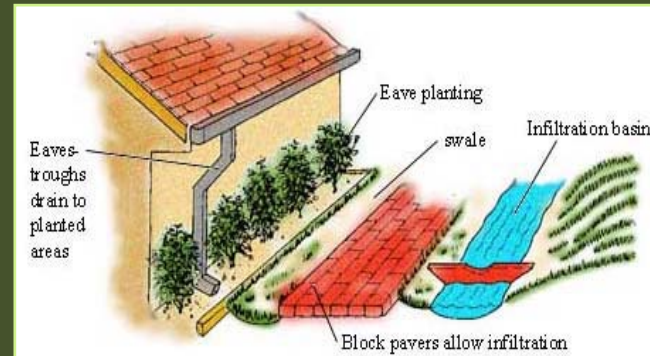
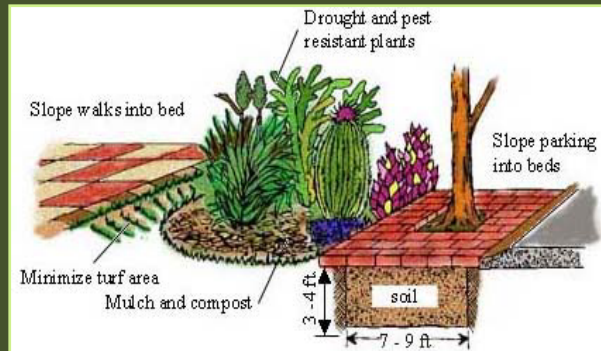
Reduce Site Disturbance

- *Intent* - Conserve existing natural areas and restore damaged areas to promote biodiversity.
- *Requirement*
 - Limit site disturbance to 40 feet beyond the building perimeter, or restore a minimum of 50% of the remaining open area.
 - Reduce the development footprint to exceed the local open space requirement by 25%.



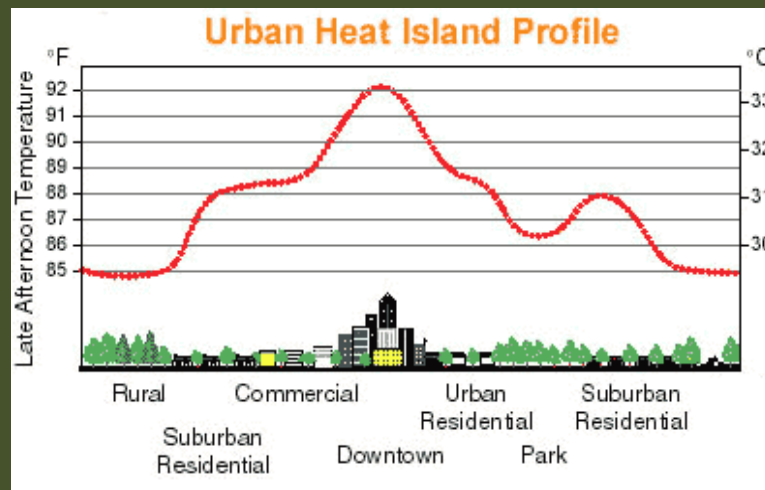
Stormwater Management

- *Intent* - Limit disruption of natural water flows by minimizing storm water runoff, increasing on-site infiltration, and reducing contaminants.
- *Requirement*
 - No net increase in stormwater, or, if imperviousness is greater than 50%, reduce the quantity of stormwater by 25%
 - Provide treatment systems designed to remove 80% of suspended solids and 40% of phosphorus



Reduce Heat Island

- *Intent* - Reduce heat islands to minimize impact on microclimate
- *Requirement*
 - Provide shade on at least 30% of non-pervious surface, or use light-colored materials, or place parking underground, or use open grid paving system
 - Use Energy Star high reflectance and low-emissivity roofing.



Renewable Energy

- *Intent* - Encourage increasing levels of self-supply through renewable technologies
- *Requirement*
 - Supply a 5% - 20% of the buildings total energy use through the use of on-site renewable energy systems.



Costs of Green Building

Soft Costs

Typical

- Architecture/design fees
- Engineering fees
- Title 24 Compliance

With LEED

- Materials research (\$5K - \$15K)
- Energy modeling (\$25K - \$50K)
- Commissioning (\$50 - \$100K)
- LEED registration fees (\$500)
- LEED certification fees (\$5,000)

Costs of Green Building

Hard Costs

- Typical \$150 - \$200/sq.ft.
- Certified Level 0% - 3% increase
- Silver Level 3% - 7% increase
- Gold and Platinum 7% - and up

Costs of Green Building

First Cost vs. Life Cycle Cost

- First cost looks only at the cost to purchase. Life cycle cost looks at all costs and savings for a product's entire life (purchase, installation, maintenance, disposal). For example, a less expensive product may be more expensive over the long run due to high maintenance or poor performance.

Sheet Vinyl

5,000 sq. ft.

\$1.50/sq.ft.

Replace every 10 years

Total 40 yr. Cost: \$30,000

Linoleum

5,000 sq. ft.

\$5/sq.ft.

Replace every 40 years

Total Cost: \$25,000

Costs of Green Building

Payback vs. Return on Investment (ROI)

- Payback considers the time to recover the initial investment. Public agencies can support long payback periods as they hold their buildings for 30-50 years. However, looking at ROI enables better comparisons between green buildings strategies and components as ROI looks at the return over the life of the investment.

<i><u>Item</u></i>	<i><u>Approx. Payback</u></i>	<i><u>Approx. ROI</u></i>
Lighting	6 -18 months	20%
HVAC Equipment	3-5 years	12%
Photovoltaic Panels	7 - 10 years (with rebates)	5%

Implementing Green Building

- Adopt green building policies for new construction, rehabilitation, and clean energy generation.
- Incorporate policies into RFQs and RFPs for architectural and engineering services.
- Incorporate receiving LEED certification or achieving specified energy performance into the A&E contract.
- Include LEED-required submittals in the contractor's scope of work.
- Make final payments contingent on receiving LEED certification.
- Develop a staff trained on LEED components and process.

Green Building Policies

Los Angeles Community College District:

All projects 7,500 sq. ft. and over shall receive a minimum of 26 - 36 in the LEED Rating System.

City of Los Angeles:

Adopt the “Certified level of the USGBC’s rating system for all Department of Public Works new design and construction projects 7,500 square feet or larger, effective July 1, 2003.

San Mateo County

It is the policy of the Board of Supervisors to finance, plan, design, construct, manage, renovate, maintain, and decommission its facilities and buildings to be sustainable. The US Green Building Council's LEED (Leadership in Energy and Environmental Design) rating system and Reference Guide shall be the design and measurement tools used to determine what constitutes sustainable building under this policy.

Why LEED™ Works for Policy

LEED works as a policy tool for the same reasons it works as a rating system for buildings:

LEED has Broad Support in the Building and Environmental Communities

- Developed through a consensus-based process
- Has become a nationally accepted standard

Precedent Has Already Been Established

- Public entities are the largest group of LEED users (SM, SF, LA, LACCD)

Why LEED™ Works for Policy

Costs can be Determined with Reasonable Certainty

- Growing number of LEED buildings provides comparable cost data.
- Rapidly growing number of architects and engineers familiar with LEED.

Risk is Minimized

- LEED™ is based on existing proven technology.
- LEED™ system offers the assurance of specific thresholds (in its point criteria) while still allowing for flexibility in implementation (in how the points are accumulated)

LEED Rating System is Maintained by Others

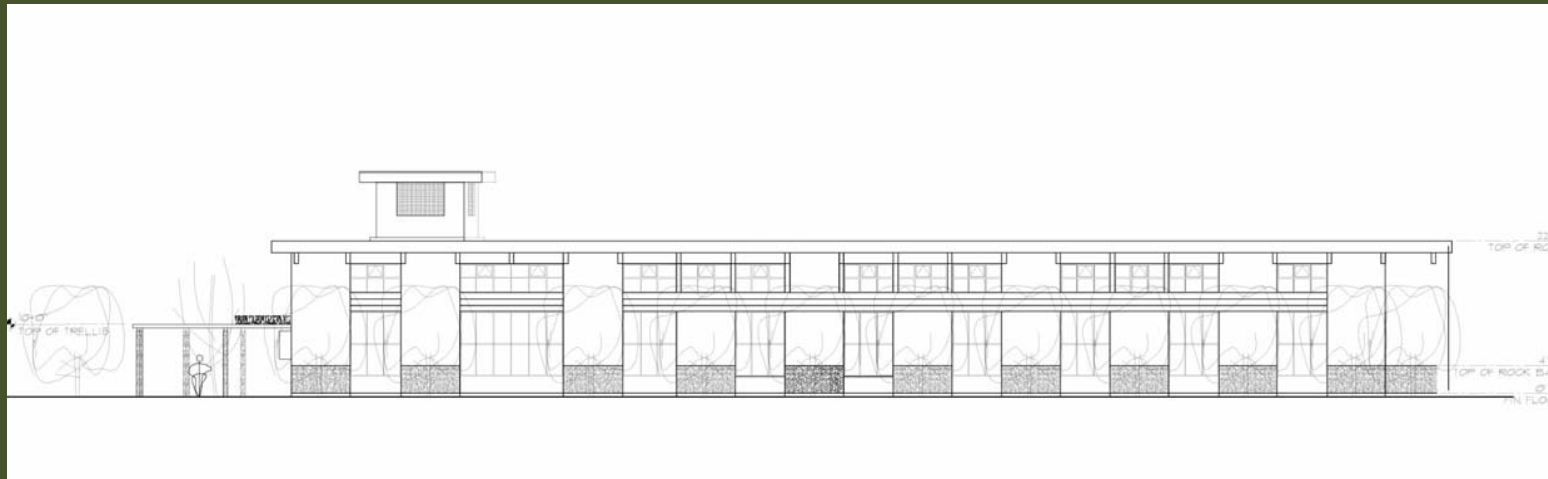
- The College doesn't need to update LEED, develop training, etc. All handled by USGBC.

Case Study - Lakeview Terrace Branch Library Los Angeles



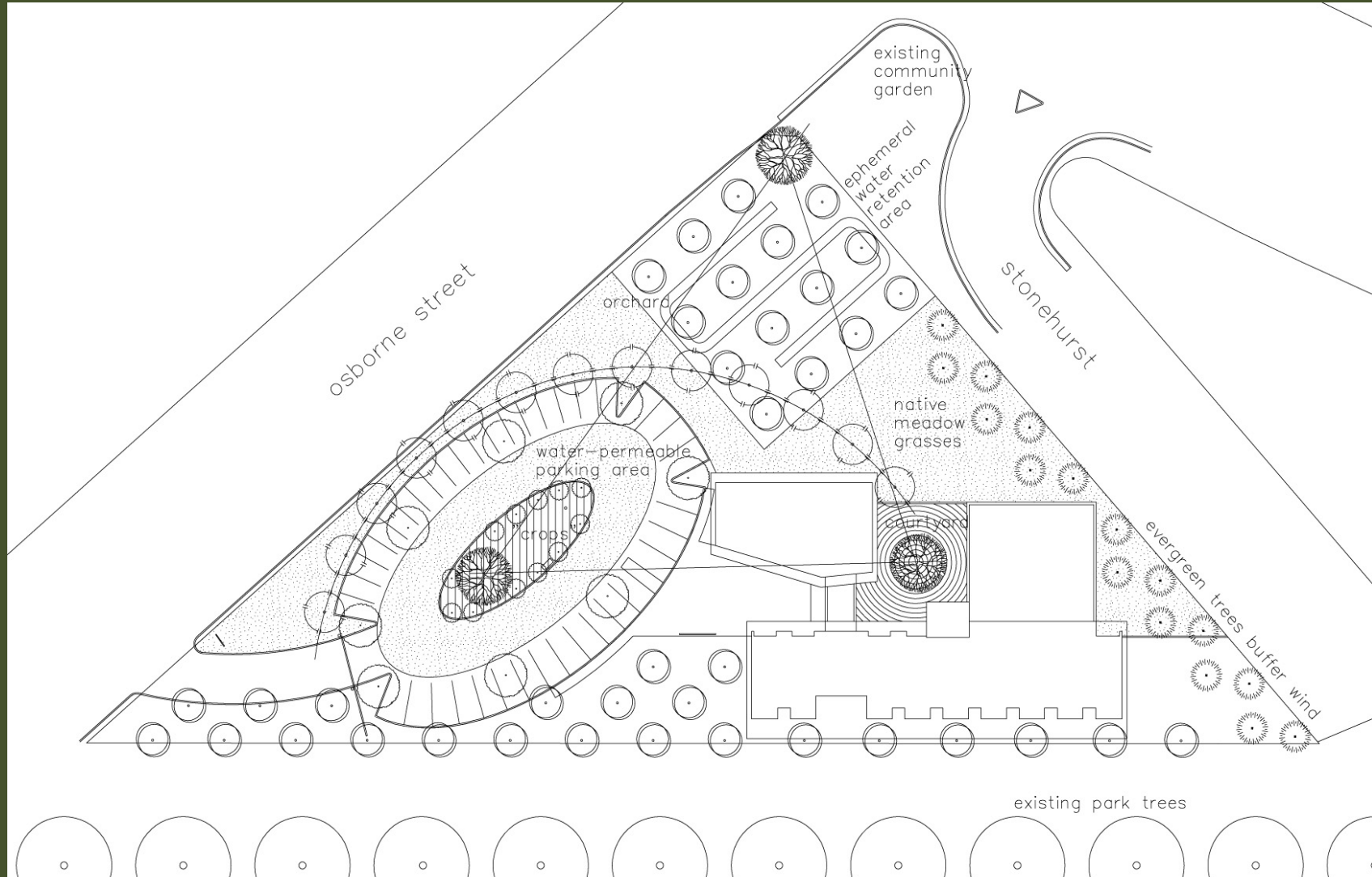
Lakeview Terrace Library, LA

- New 10,700 SF public library and environmental awareness center
- Designed to attain LEED Platinum



Architect: Fields Deveraux Architects and Engineers

Lakeview Terrace Library *Site*



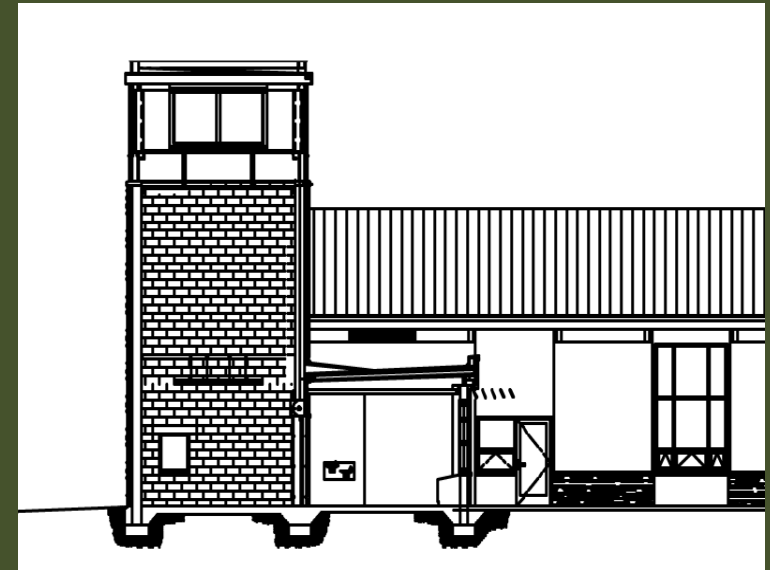
Lakeview Terrace Library *Site*

- More than half of site left as open space
- Habitat restored: native, water-efficient plantings
- Micro-sensor/weather-controlled irrigation
- Pervious “gravel pave” parking surface with retention ponds to reduce runoff and promote on-site irrigation
- Heat island effect reduced by tree planting, light-colored concrete (no asphalt), high-albedo Energy Star roofing

Lakeview Terrace Library

Energy

- Solar orientation
- Extra insulation on CMU block wall and roof
- Trellis and canopy for shading against heat and glare
- Photovoltaics at roof and trellis to supply up to 20% of the building's energy requirements
- Natural ventilation
- Carbon dioxide monitoring system

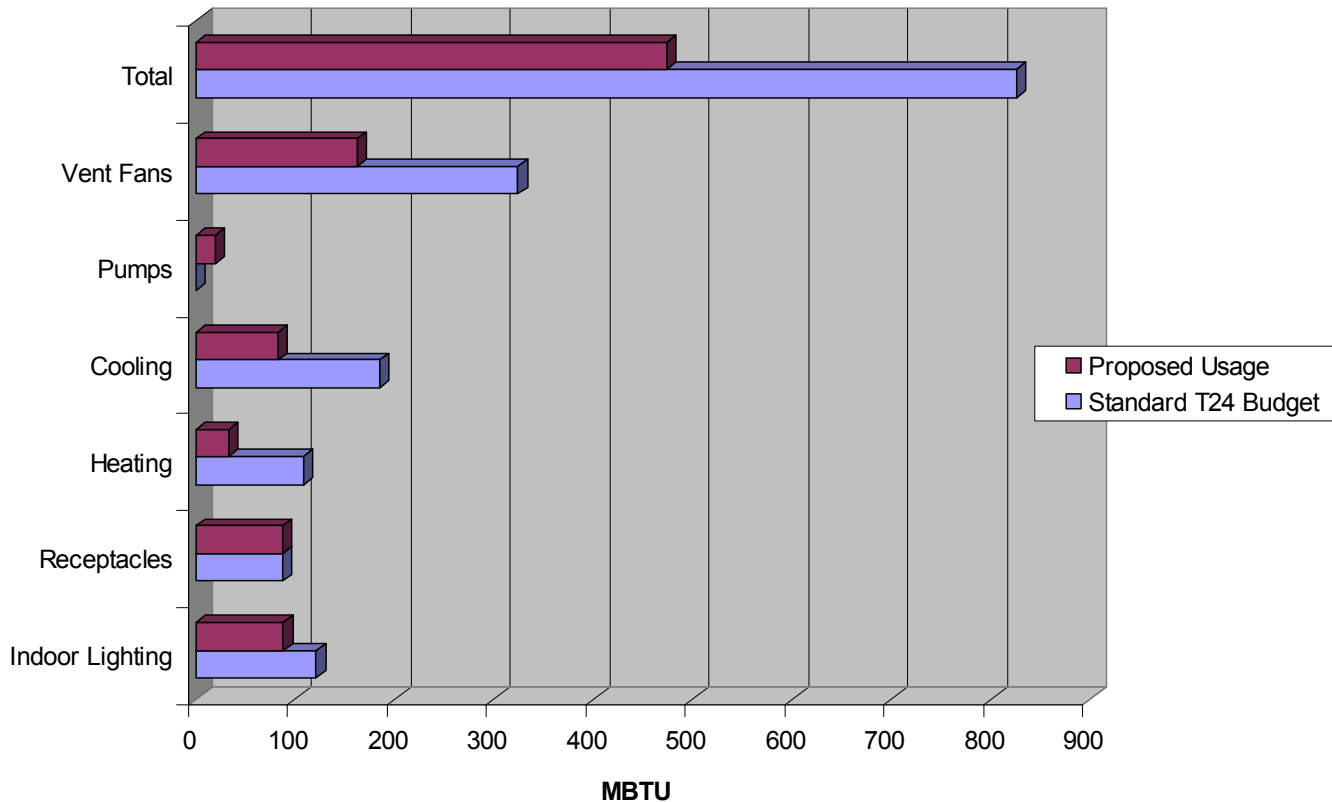


Passive cooling tower

Lakeview Terrace Library

Energy

Lake View Terrace Branch Library Energy Usage Comparison



Energy modeling indicates that the design will exceed Title 24 requirements by 40%.

Lakeview Terrace Library

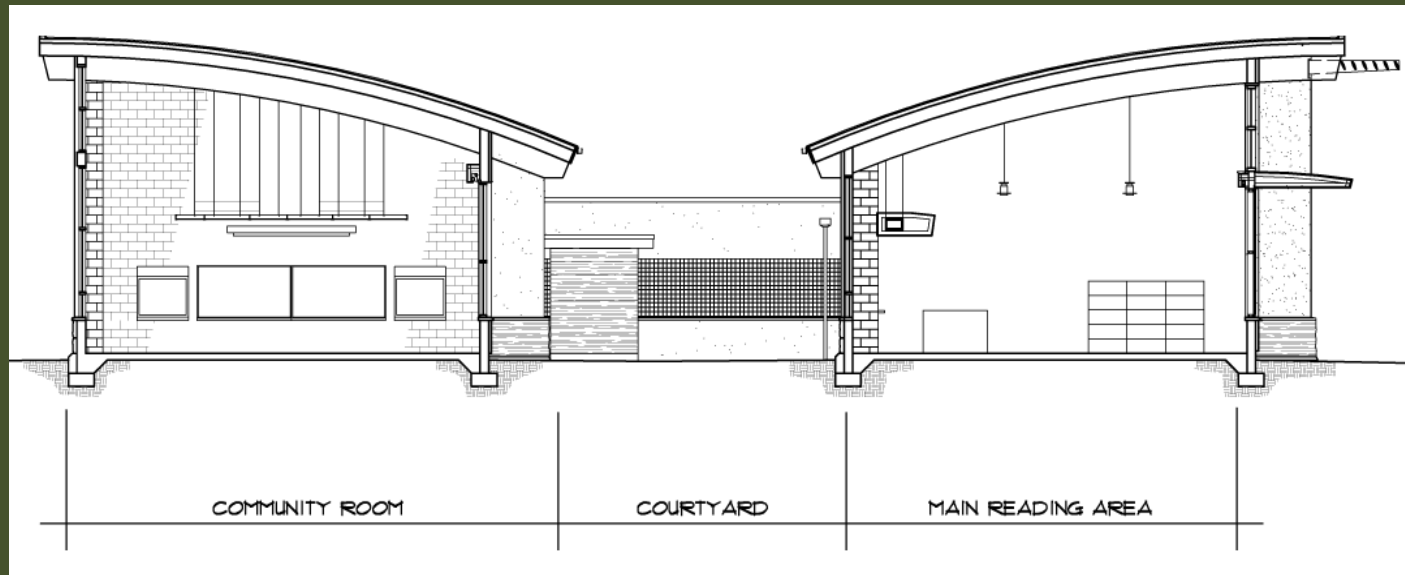
Materials / Resources

- **Recycled-content flooring, wall, and tile materials**
- **Wood products from certified sustainable forests or from rapidly renewable sources**
- **Many materials sourced from regional manufacturers (within 500 miles of project)**

Lakeview Terrace Library

Indoor Environment

- No-VOC, low-emitting materials
- Extra daylighting via courtyard and skylights:
Line-of-sight to glazing from over 90% of the regularly occupied spaces





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